IN THE CLAIMS

1. (original) A method for scene modeling and change detection in an image, comprising the steps of:

computing optical flow for said image;

performing an invariant transformation such that image pixel intensity is transformed and evaluated in an illumination-invariant space;

forming a background model in a high-dimensional space;

utilizing results of said computing optical flow and of said invariant transformation as features in said background model;

utilizing said background model to estimate probability for a current input to belong to the background;

providing a first and a second indication whenever said probability is respectively above and below a given threshold;

adding said current input to said image background model whenever said probability is above said threshold;

adding said current input to said image background model with a low probability whenever said probability is below said threshold; and

performing morphological operations on said pixel-level detection for outputting detection.

2. (original) A method as recited in claim 1, wherein said background model is developed in a high-dimensional space using kernel density estimation.

3. (currently amended) A method for dynamic scene modeling and change detection applicable to motion analysis, comprising the steps of:

making measurements of optical flow and intensities for said dynamic scene;

utilizing said optical flow measurements for capturing and modeling the dynamics of said scene;

evaluating uncertainties in said measurements; and building a probability distribution of said intensities and said optical flow in a joint 5-dimensional space comprising 3 color components and 2 flow components~~; and~~

~~combining said optical flow measurements, said intensities, and said uncertainties so as to develop a robust representation of said scene in a higher dimensional space which includes an optical flow component and a normalized color component as a dimension~~.

4. (original) A method as recited in claim 3, wherein said step of evaluating uncertainties in said measurements comprises the steps of:

applying an optical flow constraint equation at a given point defined by a spatial location and time to obtain respective constraints;

applying an error function to combine said respective constraints from each said given point within a defined region for deriving a characteristic function;

deriving a motion estimate from said characteristic function; and

comparing said motion estimate with a given uncertainty model so as to derive a figure of uncertainty for optical flow measurement data.

5. (original) A method as recited in claim 4, wherein said figure of uncertainty exhibits a Gaussian characteristic.

6. (currently amended) A method for dynamic scene modeling and change detection applicable to motion analysis, comprising the steps of:

deriving optical flow measurement data for a dynamic scene ~~having a substantially dynamic background such as naturally occurring outdoor environmental conditions~~ whose statistical properties represent a continuously evolving non-stationary stochastic process;

deriving intensity data for said dynamic scene;

deriving flow covariance matrices for said optical flow measurement data;

deriving intensity covariance matrices for said intensity data;

applying relevance criteria to said flow and said intensity covariance matrices for selecting relevant features of a subset thereof; and combining said relevant features of said subset for performing detection.

7. (original) A method as recited in claim 6, wherein said step of deriving intensity covariance matrices comprises a step of deriving covariance matrices of normalized color representation.

8. (original) A method as recited in claim 6, wherein said step of combining said relevant features comprises detection at a particular pixel.

9. (original) A method as recited in claim 6, wherein said step of deriving optical flow measurement data comprises applying the Simoncelli algorithm.

10. (currently amended) A method as recited in claim 6, wherein said step of deriving optical flow measurement data comprises the steps of:

applying an optical flow constraint equation at a given point defined by a spatial location and time to obtain respective constraints;

applying an error function to combine said respective constraints from each said given point within a defined region for deriving a characteristic function;

deriving a motion estimate from said characteristic function; and

comparing said motion estimate with a given uncertainty model so as to derive a figure of uncertainty for optical flow measurement data;

performing optimized detection by combining said optical flow measurement data and said intensity data;

deriving covariance matrices for said measurements;

evaluating uncertainties in said measurements; and

combining said optical flow measurements, said intensities and said uncertainties so as to develop a robust representation of said scene in a higher dimensional space.

11. (original) A method for dynamic scene modeling and change detection applicable to motion analysis, comprising the steps of:

making measurements of intensity;

deriving measurements of optical flow for said dynamic scene;

building a probability distribution of said intensity and said optical flow in a joint 5-dimensional space comprising 3 color components and 2 flow components;

utilizing said optical flow measurements for capturing and modeling the dynamics of said scene; and

combining said optical flow measurements, said intensities and said probability distribution so as to develop a robust representation of said scene in a higher dimensional space.

12. (original) A method in accordance with claim 11, wherein said step of building a probability distribution comprises kernel density estimation.

13. (original) A method in accordance with claim 11, wherein said step of making measurements of optical flow for said dynamic scene comprises utilizing optical flow information to discriminate between observations exhibiting similar color components.

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25. (original) Apparatus for scene modeling and change detection in an image, comprising:

means for computing optical flow for said image;

means for performing an invariant transformation such that image pixel intensity is transformed and evaluated in an illumination-invariant space;

means for forming a background model in a high-dimensional space;

means for utilizing results of said computing optical flow and of said invariant transformation as features in said background model;

means for utilizing said background model to estimate probability for a current input to belong to the background;

means for providing a first and a second indication whenever said probability is respectively above and below a given threshold;

means for adding said current input to said image background model whenever said probability is above said threshold;

means for adding said current input to said image background model with a low probability whenever said probability is below said threshold; and

means for performing morphological operations on said pixel-level detection for outputting detection.

26. (canceled)